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(54) **EXTRUDER**

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(52) **U.S. Cl.**
CPC ***B65D 35/28*** (2013.01)

(58) **Field of Classification Search**
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USPC 222/103, 95
See application file for complete search history.

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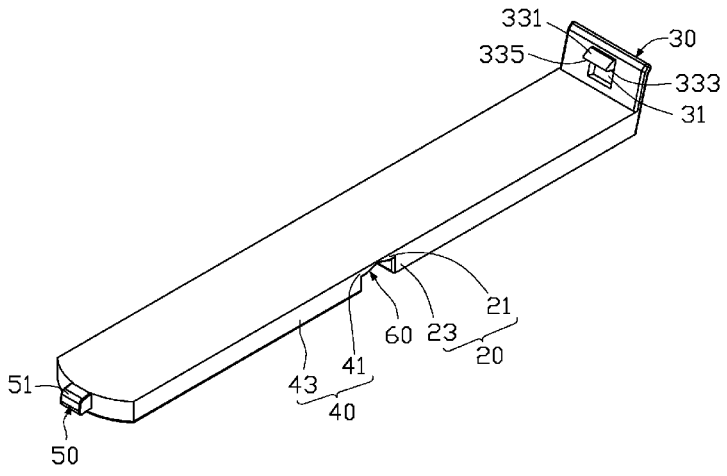
(57) **ABSTRACT**

An extruder includes a first clamping plate, a second clamping plate, a connecting plate rotatably interconnecting the first and second clamping plate, a latching member, and a positioning protrusion. The latching member is formed on an end of the first clamping plate. The positioning protrusion is formed on an end of the second clamping plate, matching with the latching member to latch the first and second clamping plate.

8 Claims, 4 Drawing Sheets



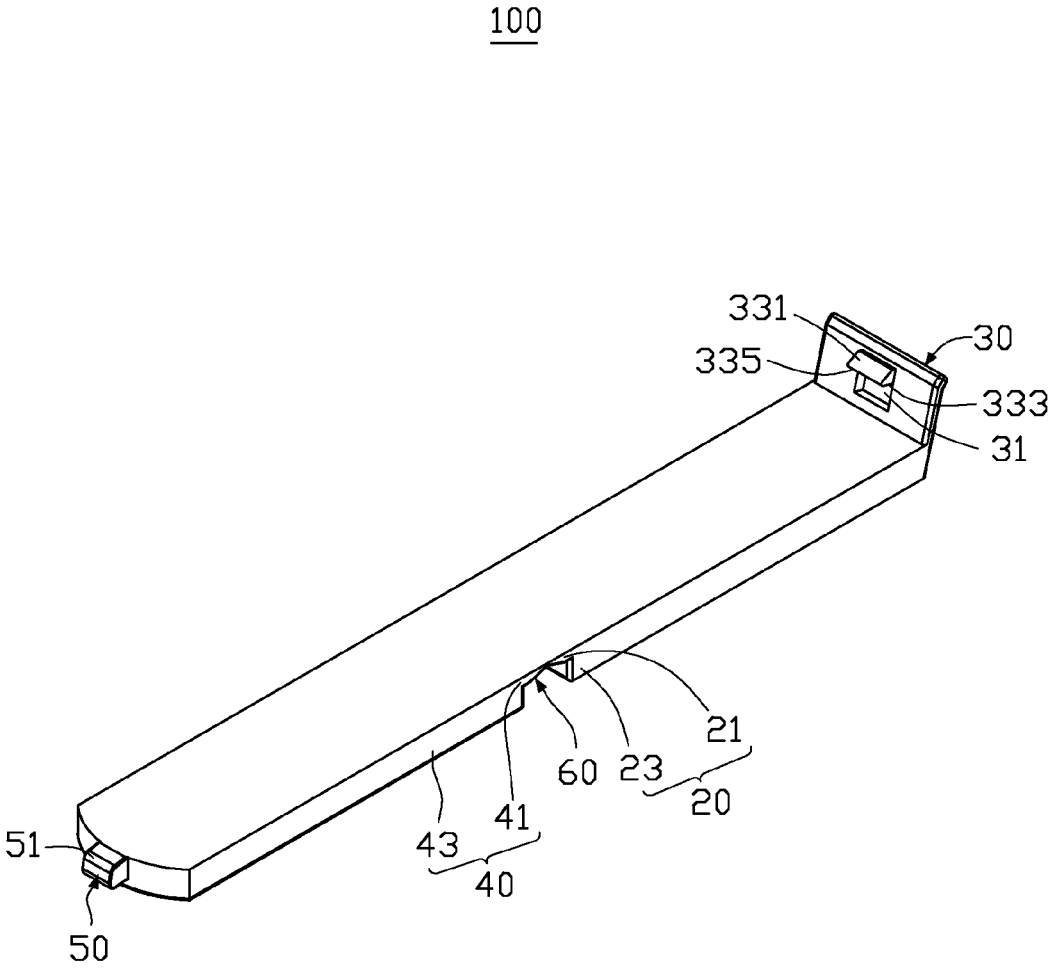


FIG. 1

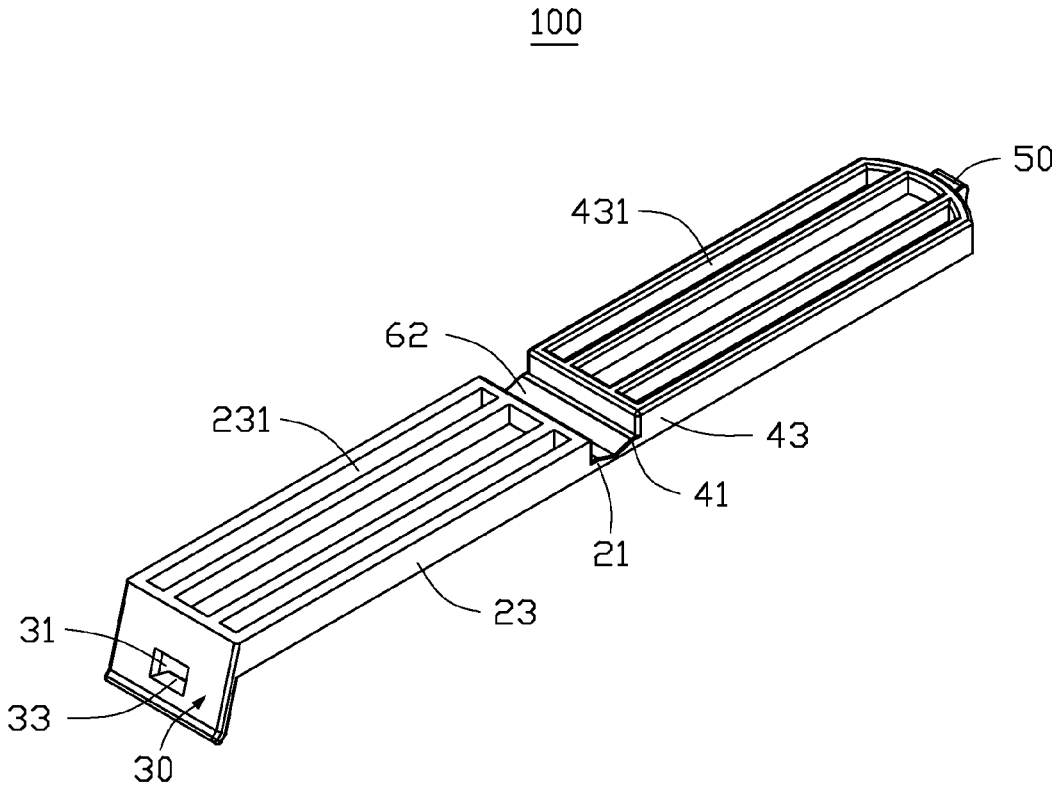


FIG. 2

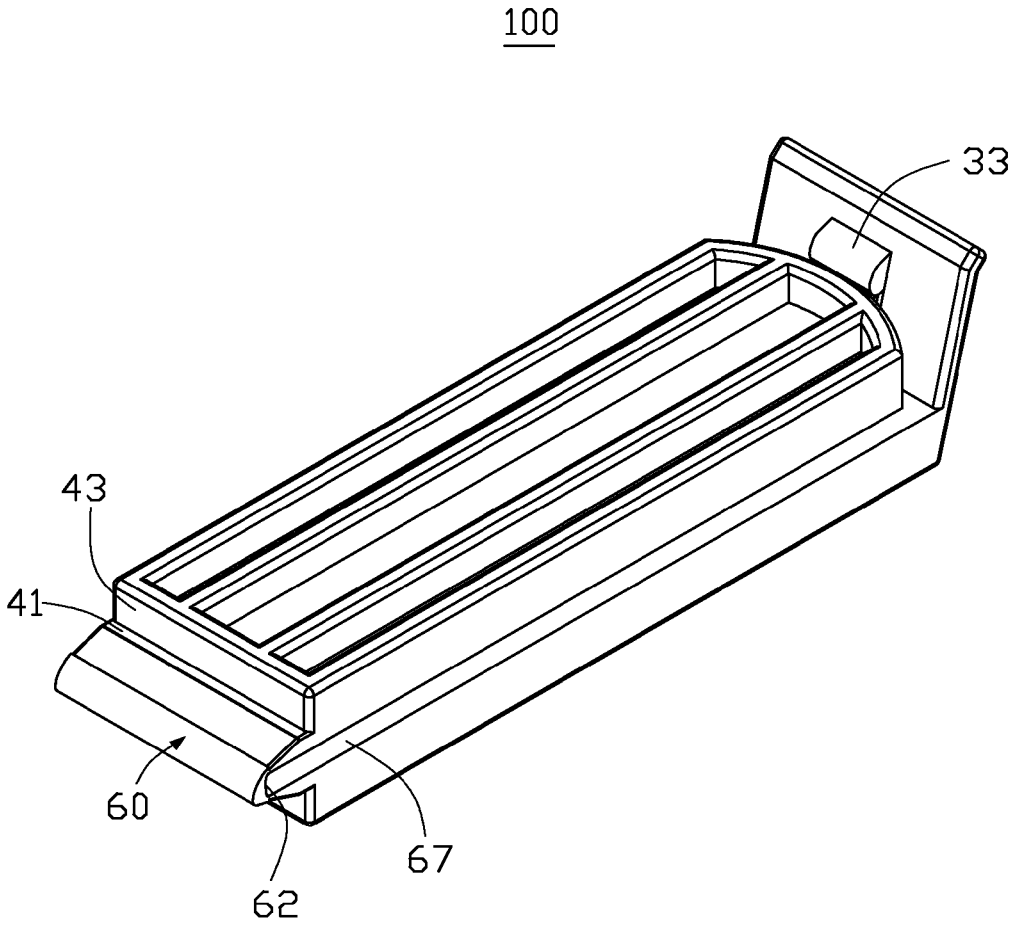


FIG. 3

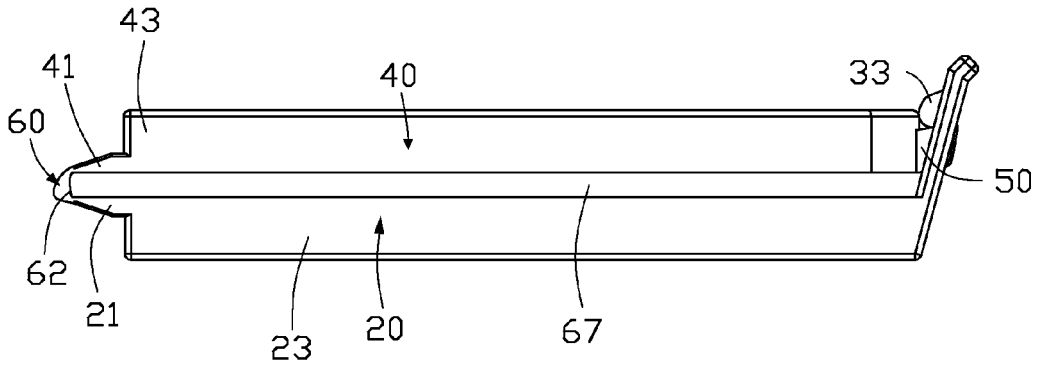


FIG. 4

EXTRUDER

FIELD

The subject matter herein generally relates to extruders, and in particular to an extruder used to squeeze contents packaged in tooth paste tubes.

BACKGROUND

Toothpaste for consumer use has long been sold in tubes requiring the user to squeeze part of the tube to extract the paste from a spout at one end of the tube.

BRIEF DESCRIPTION OF THE DRAWINGS

Implementations of the present technology will now be described, by way of example only, with reference to the attached figures.

FIG. **1** is an isometric view of an embodiment of an extruder.

FIG. **2** is similar to FIG. **1**, but viewed from another angle.

FIG. **3** is similar to FIG. **1**, but showing the extruder in use.

FIG. **4** is a side elevational view of the extruder of FIG. **3**.

DETAILED DESCRIPTION

It will be appreciated that for simplicity and clarity of illustration, where appropriate, reference numerals have been repeated among the different figures to indicate corresponding or analogous elements. In addition, numerous specific details are set forth in order to provide a thorough understanding of the embodiments described herein. However, it will be understood by those of ordinary skill in the art that the embodiments described herein can be practiced without these specific details. In other instances, methods, procedures and components have not been described in detail so as not to obscure the related relevant feature being described. Also, the description is not to be considered as limiting the scope of the embodiments described herein. The drawings are not necessarily to scale and the proportions of certain parts may be exaggerated to better illustrate details and features of the present disclosure.

Several definitions that apply throughout this disclosure will now be presented.

The term "substantially" is defined to be essentially conforming to the particular dimension, shape, or other feature that the term modifies, such that the component need not be exact. For example, "substantially cylindrical" means that the object resembles a cylinder, but can have one or more deviations from a true cylinder. The term "comprising," when utilized, means "including, but not necessarily limited to"; it specifically indicates open-ended inclusion or membership in the so-described combination, group, series and the like.

An extruder can include a first clamping plate, a second clamping plate, a connecting plate rotatably interconnecting the first and second clamping plate, a latching member, and a positioning protrusion. The latching member can be formed on a side of the first clamping plate, and be located on an end of the first clamping plate away from the connecting plate. The latching member can define a latching hole. A resisting portion can protrude from a side of the latching member adjacent to the first clamping plate, and be positioned adjacent to a side of the latching hole away from the first clamping plate. The positioning protrusion can be formed on an end of the second clamping plate away from the connecting plate. The connecting plate can be capable of bending to move the second clamping plate toward the first clamping plate. The positioning protrusion can be capable of moving into the latching hole to resist along the resisting portion, to latch the first and second clamping plate.

FIGS. **1** and **2** illustrate an extruder **100** configured to squeeze contents (paste like materials e. g. tooth paste) from a dispensing tube (not shown), such as a tooth paste tube. The extruder **100** can include a first clamping plate **20**, a latching member **30**, a second clamping plate **40**, a positioning protrusion **50**, and a connecting plate **60** rotatably interconnecting the first clamping plate **20** and the second clamping plate **40**. The latching member **30** can be positioned on an end of the first clamping plate **20** away from the second clamping plate **40**. The positioning protrusion **50** can be positioned on an end of the second clamping plate **40** away from the first clamping plate **20**.

The first clamping plate **20** can be substantially a rectangular plate, and can include a base body **21** and an enforcement portion **23** perpendicularly protruding from a side of the base body **21**. The base body **21** can be substantially a rectangular plate, and be made of plastic. The enforcement portion **23** can support the base body, and can be configured to strengthen the base body **21**, to avoid deforming into the base body **21** under stress. The enforcement portion **23** can define a number of parallel grooves **231** on a side away from the base body **21** to decrease the material.

The latching member **30** can be substantially a rectangular plate. The latching member **30** can protrude from a side of the base body **21** away from the enforcement portion **23**, and can be located on an end of the base body **21**. The latching member **30** can define a rectangular latching hole **31** and a resisting portion **33** thereon. The resisting portion **33** can protrude from a side of the latching member **30** adjacent to the base body **21**, and can be positioned adjacent to a side of the latching hole **31** away from the base body **21**. The resisting portion **33** can include a guide surface **331**, a resisting surface **333** opposite to the guide surface **331**, and a connecting surface **335** interconnecting the guide surface **331** and the resisting surface **333**. The guide surface **335** can incline toward a plane of the base body **21**, and the angle between the guide surface **331** and the side of the latching member **30** can be a first obtuse angle. The connecting surface **335** can incline toward the base body, and the angle between the connecting surface **335** and the guide surface **331** can be a second obtuse angle different to the first obtuse angle. The resisting surface **333** can be parallel to the base body **21**, and can be coplanar with a side of the latching hole **31** away from the base body **21**.

The connecting plate **60** can extend from an end of the first clamping plate **20** away from the latching member **30**, and can be made of flexible materials. The thickness of the connecting plate **60** can be the same as that of the base body **21**. The connecting plate **60** can define a bent portion **62** on a side adjacent to the enforcement portion **23**. In at least one embodiment, the bent portion **62** can be a V-shaped groove, and the connecting plate **60** can be made of plastic.

The second clamping plate **40** can be formed on an end of the connecting plate **60** away from the first clamping plate **20**. The second clamping plate **40** can substantially be a rectangular plate. The length of the second clamping plate **40** can substantially be the same as that of the first clamping plate **20**. The second clamping plate **40** can include a base body **41** and an enforcement portion **43** perpendicularly protruding from a side of the base body **41**. The base body

41 can be substantially a plate, and be made of plastic. The length and the thickness of the base body **41** can be the same as that of the base body **21**. The enforcement portion **43** can support the base body, and can be configured to strengthen the base body **41**, so as to avoid deforming into the base body **41** under stress. The enforcement portion **43** can define a number of parallel grooves **431** on a side away from the base body **41** to decrease the material.

The positioning protrusion **50** can perpendicularly protrude from a same side of the base body **41** and the enforcement portion **43** away from the connecting plate **60**. The positioning protrusion **50** can be substantially rectangular, and can define two arc chamfers **51**.

In at least one embodiment, the first clamping plate **20**, the latching member **30**, the second clamping plate **40**, the positioning protrusion **50**, and the connecting plate **60** can be integrated via a method of injection molding. In at least one embodiment, the first clamping plate **20**, the latching member **30**, the second clamping plate **40**, the positioning protrusion **50**, and the connecting plate **60** can be respectively formed, and then can be assembled to form the extruder **100**.

FIGS. **3** and **4** illustrate that when in use, a user (not shown) can put an end of the dispensing tube on the main body **21** of the first clamping plate **20**, and then bend the connecting plate **60** to deform, so as to push the second clamping plate **40** to move toward the first clamping plate **20**. When the positioning protrusion **50** resists the guide surface **331** of the resisting portion **33**, the positioning protrusion **50** can further move into the latching hole **31** to resist the resisting surface **333** along the guide surface **331** and the connecting surface **335**. In this way, the first clamping plate **20** can latch the second clamping plate **40**. A clamp space **67** can be formed between the first clamping plate **20** and a second clamping plate **40**. The dispensing tube can be received in the clamp space **67**, and be compressed by the first clamping plate **20** and the second clamping plate **40**. The vertical height of the clamp space **67** can be less than 3 millimeters. In other words, a distance between the first clamping plate **20** and the second clamping plate **40** can be less than 3 millimeters. And then the user can use one hand to firmly hold the end of the dispensing tube, and the other hand to move the extruder **100** toward another end of the dispensing tube. The extruder **100** can slip over the end of the dispensing tube and compress the walls of the dispensing tube together forcing the toothpaste within the dispensing tube toward the other end of the dispensing tube.

In at least one embodiment, a buffer layer (not shown) can be coated on a side of the base body (**21**, **41**) away from the enforcement portion (**23**, **43**) and be configured to buffer folds of the dispensing tube, leading the extruder **100** to slip smoothly. In at least one embodiment, a number of ball bearings (not shown) can be formed on the side of the base body (**21**, **41**) away from the enforcement portion (**23**, **43**) and be configured to decrease a contact area between the dispensing tube and the extruder, allowing the extruder **100** to slip smoothly. In at least one embodiment, a number of steel rods (not shown) can be formed in the base body (**21**, **41**) to strengthen the base body (**21**, **41**).

While the present disclosure has been described with reference to particular embodiments, the description is illustrative of the disclosure and is not to be construed as limiting the disclosure. Therefore, those of ordinary skill in the art can make various modifications to the embodiments without departing from the scope of the disclosure, as defined by the appended claims.

What is claimed is:

1. An extruder comprising:

a first clamping plate;

a second clamping plate;

a connecting plate rotatably interconnecting the first clamping plate and the second clamping plate;

a latching member formed on a side of the first clamping plate, located on an end of the first clamping plate away from the connecting plate, protruding obliquely to the first clamping plate at a standing state, defining a latching hole, and a resisting portion protruding from a side of the latching member adjacent to the first clamping plate and positioned adjacent to a side of the latching hole away from the first clamping plate; and

a positioning protrusion formed on an end of the second clamping plate away from the connecting plate,

wherein the connecting plate is capable of bending to move the second clamping plate toward the first clamping plate, and the positioning protrusion is capable of moving into the latching hole to resist along the resisting portion, to latch the first clamping plate and the second clamping plate, and the latching member keeps in the standing state when the positioning protrusion is latched.

2. The extruder of claim **1**, wherein the first clamping plate comprises a base body and an enforcement portion perpendicularly protruding from a side of the base body, and the second clamping plate comprises a base body and an enforcement portion perpendicularly protruding from a side of the base body.

3. The extruder of claim **2**, wherein the enforcement portion of the first clamping plate and the enforcement portion of the second clamping plate define a number of grooves on a same side, respectively.

4. The extruder of claim **1**, wherein the first clamping plate and the second clamping plate cooperatively form a clamp space therebetween after latching the first and second clamping plate, and the vertical height of the clamp space is less than 3 millimeters.

5. The extruder of claim **1**, wherein the connecting plate defines a bent portion on a side thereof.

6. The extruder of claim **5**, wherein the bent portion is a groove.

7. The extruder of claim **1**, wherein the resisting portion comprises:

a guide surface inclined to the first clamping plate;

a resisting surface opposite to the guide surface and parallel to the first clamping plate; and

a connecting surface interconnecting the guide surface and the resisting surface and inclined to the first clamping plate,

wherein the positioning protrusion resists the resisting surface after latching the first and second clamping plate.

8. The extruder of claim **7**, wherein the positioning protrusion defines two arc chamfers on an end thereof.

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